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# GLP KS2 Maths Lesson
# Painting the world by numbers

## Lesson title

> **Poverty in 2030?**

## Year 5 learning objectives

- Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit.
- Solve problems that involve these numbers.
- Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred'.
- Solve comparison, sum and difference problems using information presented in a line graph and in tables.

## Materials provided

- Lesson plan
- PowerPoint® presentation
- Cost of living in the UK fact sheet
- Lesson 1 worksheet: Poverty
- Lesson 2 worksheet: Poverty and inequality

## Other materials needed

- Sustainable Development Goals poster »
- Rights of the child poster »

| PowerPoint slides and resources | Time allocated | Maths and context |
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Throughout this lesson, pupils will be asked to estimate, calculate and compare various statistics that describe poverty and other aspects of globalisation. **These parts of the lesson are highlighted below in red.** Pupils should record in their maths books all numbers that are explored and thus create a page of numbers that 'paint' or describe the world. At the end of the lesson, they will be asked to isolate which numbers they believe to be the most important or interesting, so it is essential that as they record numbers, they clearly describe what these numbers are referring to, using units of measurements and/or descriptions of quantities.

These resources are to be used flexibly, but the slides could be split so as to support two linked lessons. Lesson one could be slides 1 to 15 and lesson two could be slides 16 to 20.

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| **1, 2, 3, 4** | 5 minutes | **Introduction – introducing the lesson**<br>Outline the aims and objectives of the lesson and set the context. The aims are taken from the Purpose of Study and Aims for Mathematics 2014 NC England. The learning objectives are taken from year 5. |
| **5, 6, 7, 8** | 10 minutes | **Introduction**<br>An important aim of this lesson is to help pupils see that numbers help to describe and interpret the world. Without them, it's very difficult to be specific about anything. You might say the following to the class: Imagine paying your teachers too much money... Imagine putting too much sugar in the cake... Imagine getting the time wrong to catch the bus... Imagine not being able to describe how long you spent doing your homework...<br><br>**Slide 5:** Ask pupils to tell you about the numbers on the slide. What could they be describing? Do any of them look familiar? They might recognise 2030 as a year, but the others will seem fairly obscure.<br><br>**Slide 6:** Now remind pupils that numbers describe a quantity and that the way we describe these quantities varies according to their context. Contexts and quantities fall into a number of categories: distance, volume/capacity, time, weight, money. etc. With this in mind, can pupils now suggest a more specific meaning for these numbers? Make sure their answers are reasonable – ask pupils to challenge each other if this is not the case – for example, 2030 kg of chocolate would be OK for a factory but not for your packed lunch! 193 miles is good to describe a distance from one place to another but not to describe how far you have to walk to school. 17 minutes is good to describe the time it takes you to eat your dinner but not the time it takes to grow the crops/food involved.<br><br>**Slide 7:** Explain that all these numbers are actually connected to the number 1. They describe key features of some international goals and targets that have been set by world leaders to protect and sustain our (1) planet. One world. Explain that by the word 'planet' we mean people, all living things and places. |

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| Lesson 1 worksheet: Poverty | | **Can pupils match up the units of measurement to the numbers?** Ensure that their ideas are reasonable! (You might need to explain the term 'goal' and 'target' – keep it simple. Describe learning objectives as targets, and goals as a general competency, such as becoming a good mathematician or a fluent reader.)<br><br>**Slide 8:** Show pupils where these numbers came from. They should be able to check their ideas/answers. It is important to show these answers within the original sentences/context so that pupils develop their ability to solve world problems. |
| **9** | 5 minutes | **Introduction – introducing all the Global Goals, their purpose, role and origin**<br><br>Explain that these infographics illustrate all the Global Goals/ Sustainable Development Goals. Each goal has a number of specific targets. **(169 in total!)**<br><br>*Do a little background reading about how/where/why the Global Goals/Sustainable Development Goals have been established in order to enable a short discussion in class about them.*<br><br>Ask pupils to describe what they think some of these goals are about and what they are in response to. Encourage pupils to consider the fact that these are Global Goals. You might ask the following questions: how are these likely to be relevant/different/challenging in different localities? Are the goals for Liverpool the same as for New York, and are the goals for India the same as the goals for China? (The answer is 'yes' but to different degrees as starting points will differ.) **Can pupils suggest any numbers to describe any of the Global Goals?** Their answers are very likely to be inaccurate but encourage reasonable answers that begin to describe features of the world such as population, temperature, water, energy etc. |
| **10** | 5 minutes | **Percentages and poverty – percentage check**<br><br>According to what you have previously done in relation to percentages, explain the idea of percentages in relation to an equal sharing of an amount into 100 pieces. Then quickly relate this to wealth, as described in the slide. |
| **11, 12**<br>Cost of living in the UK fact sheet | 15 minutes | **Percentages and poverty – introducing poverty**<br>**Slide 11:** Ask pupils to describe what they think the term 'poverty' means. Again, encourage numbers in their answers, which will not be accurate and may only be on their way to being 'reasonable'. Use their answers as a way of beginning to address stereotypes such as |

'all people who live in Africa are poor' or 'poverty means you live on the streets'. Begin to suggest that poverty is to do with not being able to make 'healthy' choices because you do not have the resources (money) to do so. Explain that people living in poverty may be forced to make difficult decisions: 'Should I buy bread or pay the heating bill?' or 'Should I pay for school shoes or pay the rent?' Begin also to explore how these decisions and questions may look different in different parts of the area where the pupils live, as well as across England, the UK and the world.

**Slide 12:** This is the definition of poverty that we will work with. Further activities in this lesson will look at some statistics to illustrate this definition. **To begin with, however, give pupils the current exchange rate for \$ to £ and challenge them to convert this \$1.90 a day into £.** Now relate this amount per day to things that are consumed on a daily basis in the UK. Food, electricity, transport etc. How far does the money go? How does this work over a week, or a month? **Ask pupils to create a range of calculations describing daily/weekly purchases using this daily/weekly amount** – they can use the fact sheet provided to help them after you have explored what they think each of the totals might be.

Spend a little time discussing whether these costs might differ in different parts of the world. Ask: 'Does food cost the same everywhere relative to salary? Does energy cost the same everywhere relative to salary?' Point out that a small salary is OK if commodities are cheap and that a large salary is only OK if commodities are relative to this – for example, in London, it is difficult to be able to afford to rent or buy a house even if you are earning what sounds like a large salary.

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**Percentages and poverty**

The answer to these questions are:

1999: The population of the world was approximately 6 billion. 29.2% of the world lived in poverty.

2012: The population of the world was 7.1 billion. 12.7% of the world lived in poverty.

Ask what pupils think the population of the world is today. (7.5 billion in December 2017)

What do they think the population of The UK is today? (65,647,239)

What percentage of these people live in poverty? (0.2% in 2014)

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| | | Challenge the likely assumption that 0.2% is 'good' because that is very low. 0.2% of 65,000,000 is 130,000. That's equivalent to all the people who live in Oxford! This data and calculation shows that we need to really think and analyse statistics in order to fully understand them. So 130,000 people in the UK live in poverty. What is it like for those people? How do they feel? How do they manage to stay healthy/warm/educated etc.? |
| | | Note that there are some big numbers here but help pupils to read and understand the place value with all those zeros and then explain that this is why such big numbers are often abbreviated to decimals with text (e.g. 7.5 billion). |
| **14** | 15 minutes | **Inequality facts – exploring inequality (calculations and reasoning)**<br>Refer back to the statistics about the UK. (Population 65.6 million and 0.2% live in poverty).<br>**Can pupils estimate the percentage of people who lived in poverty in Brazil in 2015?** (4.3%. Are they surprised this had risen since 2014? Why might that be?)<br>**Can pupils estimate the population of Brazil?** (206 million).<br>(Brazil and Madagascar have been chosen as they are likely to be familiar to pupils – but other countries could be chosen that are more relevant to your class if appropriate.)<br>**Round 4.3% to the nearest whole and then ask pupils to estimate and then calculate 4% of 206 million – round 206 million to 200 million if necessary. Pupils may like to calculate 1% and then multiply by 4.** |
| **15** | 5 minutes | **Inequality facts – comparing statistics**<br>Compare all the statistics that have been studied so far.<br>To help pupils understand some of these amounts that describe the number of people who live in poverty, **find out the population of the town/city where you live**.<br>(A few population examples: Leeds 715,000; Manchester 2.6 million; London 8.8 million; Newcastle 547,000.) |
| **16** | 10 minutes | **Inequality facts – causes of poverty – inequality**<br>Discuss the first quote with pupils. Explore the numbers within it. What stats from the previous slide can we use? Is this fair? |

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| | | Ask pupils to draw a diagram that begins to represent this inequality. (There are some interesting versions online if you search for them, e.g. from Huffington Post, Oxfam, Korn Ferry Institute.) The scale is difficult, but the attempts to draw this will reveal their understanding of the proportions here and help them to realise the inequality. |
| | | Look at the second quote, which is from OECD (an international body − Organisation for Economic Co-operation and Development) and discuss how this explains that an imbalance of wealth is referred to as 'inequality' and is a significant contributor to poverty because the wealth of the world is not shared equally. The next slide gives some examples of payments made to various groups of people around the world. Pupils should write similar pairs of calculations to illustrate this inequality. |
| | | The two photos on this slide illustrate inequality. Discuss what might have led to the circumstances depicted in the images. |
| **17** | 10 minutes | **Inequality facts**<br>Explain the maths here and how this relates to fair trading. This lack of fair trading is what promotes and drives inequality.<br><br>Discuss: The photograph shows a farmer. How will he distribute any profit amongst his workers? Is he being paid fairly by the land owner? |
| **18**<br>Lesson 2 worksheet: Poverty and inequality | | **Inequality facts**<br>Ask pupils how each of these businesses should divide their income, referring back to the maths in the previous slide. Encourage two contrasting calculation examples again for each image – a 'fair share' and the other an unequal split. The teacher could provide pupils with a suitable number of employees related to each harvest according to the ability of the class or groups of pupils. Alternatively, pupils can choose the number of employees for themselves, which could lead to a discussion about how many people are likely to work as part of the 'harvest team' and what roles they may have. Is each role worthy of the same payment/salary? There are units of measurement here that may also be unfamiliar. Relate them to area and length to describe fields.<br><br>**Extension A:** Pupils might like to explore some data that describes Fairtrade sales and other related practices. Do pupils think businesses in different countries are treated the same? How do they think each of these payments relate to basic costs for healthy living in each of these places? |

| | | **Extension B:** There are some accessible graphs and data sets about inequality in the UK at https://www.equalitytrust.org.uk/scale-economic-inequality-uk |
| | | Ask pupils to explore this data and create their own quiz about what the numbers reveal. |
| **19** | 5 minutes | **Human rights and inequality**<br>Discuss briefly how inequality and poverty affect human rights. Important facts, for example, include the statistics in each of the circles in the slide. **Ask pupils to write what they think the numbers are referring to before you reveal the answers, which they should also write down.** They should compare their ideas to the actual answers.<br><br>Explain also that inequality can be a result of famine, climate, natural disasters and war.<br><br>Worldwide, more than 700 million people lack access to safe water and more than two billion don't have adequate sanitation. Relates to Article 25 (Source: https://www.oxfam.org.uk/what-we-do/issues-we-work-on/water)<br><br>4,134 people slept on the streets in England on average per night in 2016. Related to Article 17. (Source: https://www.crisis.org.uk/ending-homelessness/about-homelessness/)<br><br>31.7 million girls were out of school in 2014 worldwide. Related to Article 26. (Source: https://data.worldbank.org/topic/education)<br><br>In 2014, there were 19.5 million refugees in the world. Related to Article 17. (Source: http://www.worldbank.org/en/topic/roadtorefuge/brief/refugee-factsheet)<br><br>**Extension:** What other facts and figures can pupils uncover and explain that demonstrate the lack of human rights that some people experience in the world – near and far? |
| **20** | 10 minutes | **Conclusions**<br>So we have looked at poverty in a variety of contexts using a variety of examples.<br><br>**Assessment Task:** Considering all the statistics that have been explored in this lesson, 'paint' your own version of the world in numbers. Consider carefully how to represent each number and be ready to explain to others how you have organised your painting.<br><br>**Extension:** Allow pupils some time to explore other infographics that describe the world. There are some stunning examples! Explore how these graphics are organised, what stories they tell and to what extent the statistics are represented effectively. How persuasive are the images and why is this the case? |

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| | | **Conclusion:** The world is rapidly changing. We all have a responsibility to ensure that we make a positive contribution to a globalised world. By exploring statistics that describe the world we can deepen our understanding of how and why the world is changing. As young mathematicians, we should strive to ensure that 'global data' paints an increasingly fair and just picture of our world. |

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